Journal of Physical Chemistry B 2013 vol.117 N25, pages 7833-7842

Detailed EPR study of spin crossover dendrimeric iron(III) complex

Domracheva N., Pyataev A., Vorobeva V., Zueva E.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The unusual magnetic behavior of the first dendritic Fe3+ complex with general formula [Fe(L)2]+Cl -·H2O based on a branched Schiff base has been investigated by electron paramagnetic resonance (EPR) and Mössbauer spectroscopy. EPR displays that complex consists of the three types of magnetically active iron centers: one S = 1/2 low-spin (LS) and two S = 5/2 high-spin (HS) centers with strong low-symmetry and weak distorted octahedral crystal fields. Analysis of the magnetic behavior reflected by I versus T (where I is the EPR lines integrated intensity of the spectrum) demonstrates that the dendritic Fe3+ complex has sufficiently different behavior in three temperature intervals. The first (4.2-50 K) interval corresponds to the antiferromagnetic exchange interactions between LS-LS, LS-HS, and HS-HS centers. The appearance of a presumable magnetoelectric effect is registered in the second (50-200 K) temperature interval, whereas a spin transition process between LS and HS centers occurs in the third (200-330 K) one. The coexistence of the magnetic ordering, presumable magnetoelectric effect, and spin crossover in one and the same material has been detected for the first time. The Mössbauer spectroscopy data completely confirm the EPR results.

http://dx.doi.org/10.1021/jp403682p